Navy ILE Learning Objective Statements Specifications and Guidance

ILE

Integrated Learning Environment

1 February 2006

List of Effective Pages

Section	Page(s)	Affected paragraph(s)

Change Record

Paragraph	Description of Change	Date	Authorized By

Acronyms, Abbreviations, Definitions

ADL   Advanced Distributed Learning
EIIIs   Echelon III Commands
ILE   Integrated Learning Environment
IMDP   Instructional Media Design Package
KSAs   Knowledge, Skills, Abilities
KSATTR   Knowledge, Skills, Tools, Abilities and Resources
LO   Learning Object
LOS   Learning Objective Statement
NETC   Navy Education and Training Command
SCORM   Sharable Content Object Reference Model
SL   Science of Learning

See the ILE website for a complete list of acronyms, abbreviations and definitions.

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1.   Purpose

The purpose of this document is to identify the specifications needed to create, store, review, search, and maintain learning objects within the Navy's Integrated Learning Environment (ILE). The document serves as the baseline to advance the development of learning objectives and learning objective statements that will serve as a link between the SkillObjects™ and related work elements, the learning events, and the content.

2.   Policy

Learning objectives will be designed, developed, implemented, and maintained within the Navy Education and Training Command (NETC) using guidelines reflected herein. The ILE Content Lead is the claimancy's process owner for this document. Learning objectives placed within the ILE are the property of the government and it is the government's responsibility to ensure learning objective integrity; i.e., performance- or evidenced-bases are current, accurate, and relevant.

3.   Action

The implementation of these specifications and guidance is the responsibility of the NETC Echelon III Component Commands. All Echelon III Commands (EIIIs) will ensure new learning objectives are written in accordance with the ILE specifications identified in this document. When legacy content is repurposed, the learning objectives must be rewritten to reflect these new specifications. As EIIIs meet with the ILE Content Lead to develop course/content prioritization lists, the new specifications should be addressed in the statements of work. In the event, training requirements cannot be sufficiently substantiated or articulated with the current verb list, the EIII representative should contact the ILE Content Lead so that verbs are added into the corporate system regularly.

4.   Background

Learning objectives serve as the link between SkillObjects[SM] and related work elements, Enterprise Competencies (i.e., competencies that show the linkage between DoD and Navy mission-essential competencies), and content. As the Navy moves forward with the ILE as the learning platform for SeaWarrior, there is an identified need to develop a common language or data model to capture, store, share, and reuse learning objectives which may then be assembled into learning objective statements to support content-specific learning objects. Learning objective statements will be formulated using SkillObjects™ taxonomy as the foundation for defining job/position requirements for position knowledges, skills, tools, abilities and resources (KSATTR) to represent the full spectrum of work proficiency required.

The data model includes structure, syntax, and semantics of the learning objective. This effort of statement specificity affords the opportunity to house learning objectives in repositories. Learning objectives (verb and object) stand alone. Learning objective statements (behavior, condition, and standard) are set in the context of the learning event and the content. See Figure 1.
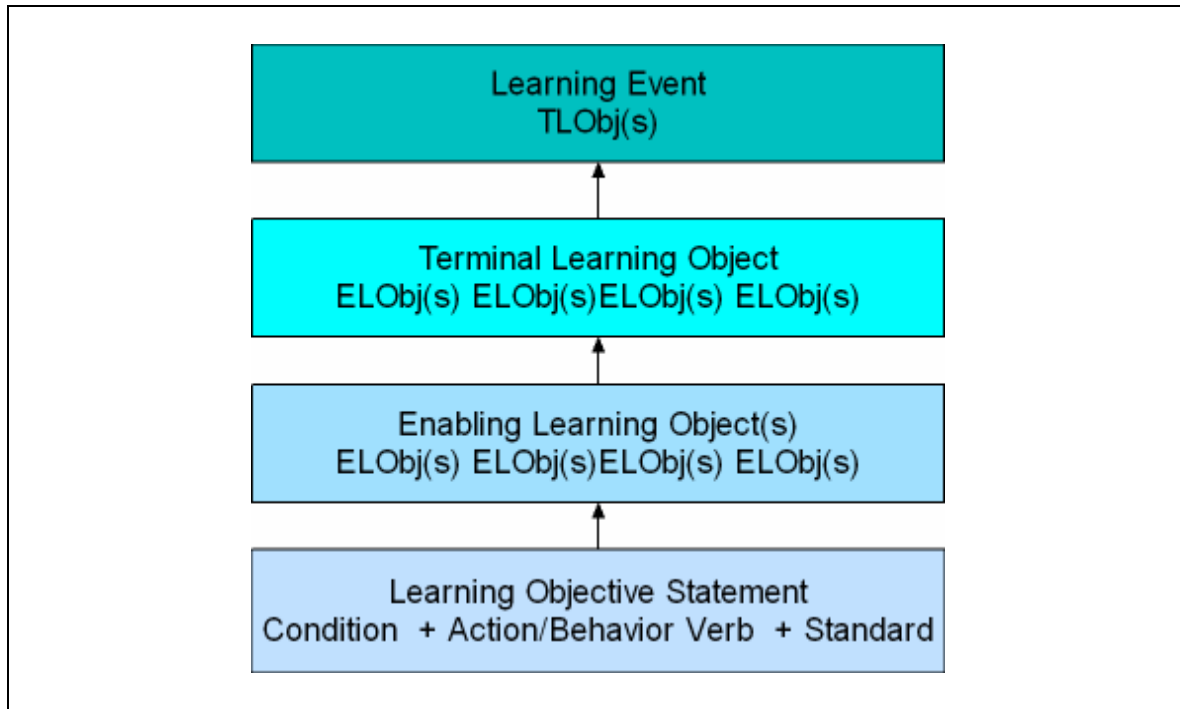
Figure 1   Assembling a Learning Event

A learning objective statement acts as the trigger or catalyst for the assembly and aggregation of content assets to form terminal and enabling learning objects. These objects may then be logically connected to enterprise competencies structured from SkillObjects™ which are work element aggregations of required KSATTR.

Instructional designers use learning objective statements as the cornerstone to designing content. Traditionally, learning objective statements are used to:

- Offer a means to designers to select and organize activities and resources associated with the learning process.
- Provide a means by which assessment can measure a learner's performance or evaluate a program's validity and reliability.
- Identify the skills and knowledge that must be mastered in the learning event (Morrison, Ross, & Kemp, 2004).
- Serve as anchor points in sustaining proper alignment between competency gaps, terminal objective and enabling objective selection, content assembly, sequencing, delivery methodology and medium, student assessment, and program evaluation.

5.   SkillObject-Content Traceability Matrix

SkillObjects™ are measurable, reusable detailed descriptions of what people do to accomplish work. These occupational skills contain logically grouped KSATTR that are statistically validated and legally defensible. Performance statements are behavioral in nature and are directly linked to SkillObjects™ and levels of expertise for all Navy jobs. Performance statements describe exemplary behavior and consist of a concrete action verb, a condition, and a criterion that qualifies exemplary performance of the

SkillObject[TM]. SkillObject[TM] performance statements may also include a referenced standard of performance (e.g., technical documents).

As visualized in Figure 2, learning objective statements forge the connection between required work capability and related learning content.
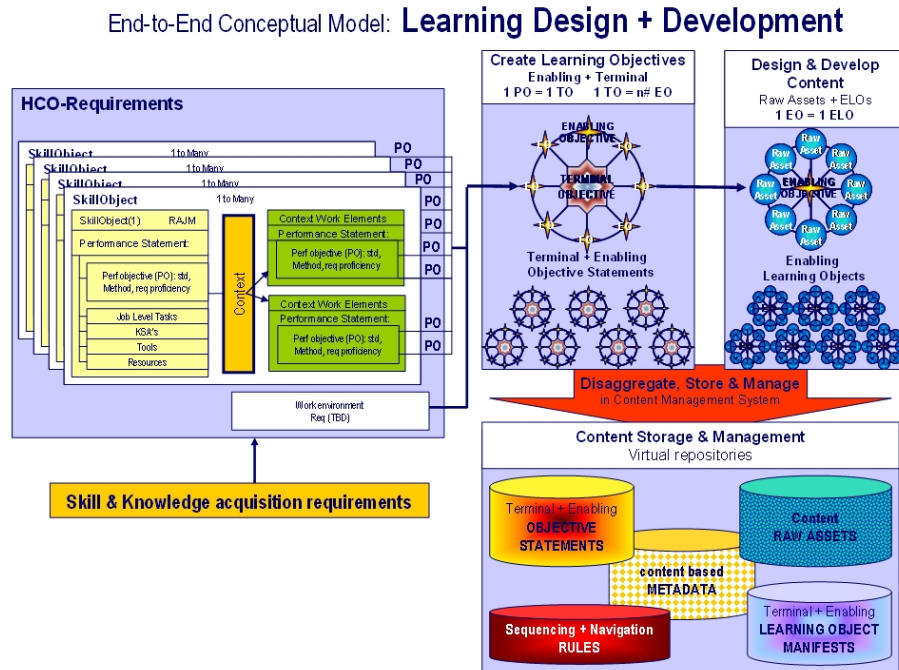
Figure 2   End-to-End Conceptual Model

At the occupational level (the job task analysis data), performance statements represent the presence (provide evidence for evaluation) of the composite set of knowledge, skills, and abilities that define the *"what"*---a SkillObject [TM]. To gain the knowledge, skills, and abilities that comprise a SkillObject [TM], the performance statement serves as the basis for construction of the terminal learning object (TLO). While the performance statement describes the evidence of the work at the SkillObject [TM] level, context must be added to relate performance to a learning objective. Once context is provided, the performance objective then provides linkage to the terminal objective statement.

Figure 3 illustrates the Performance Statement-Terminal Objective Statement matrix.

Figure 3   Performance Statement –Terminal objective Statement Matrix
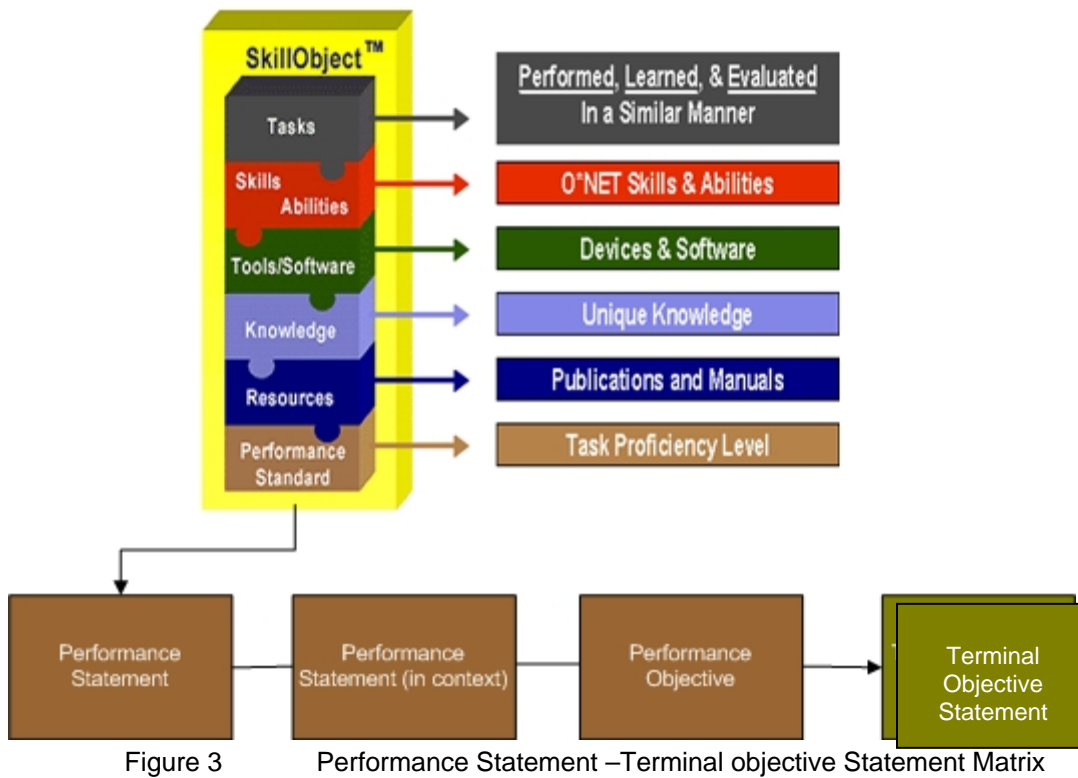
At the learning level (training analysis data), performance statements represent the presence (provide evidence for evaluation) of the composite set of knowledges, skills, and abilities that make up *how the SkillObject*[TM] *is learned in context.*

Once the performance objective is linked to the terminal objective statement, an analysis of the contextual SkillObject[TM] data provides foundation for formulation of one or more enabling objective statements.

Figure **4** illustrates the crosswalk between SkillObject[TM] performance statements, performance objectives, terminal objective statements and enabling objective statements.
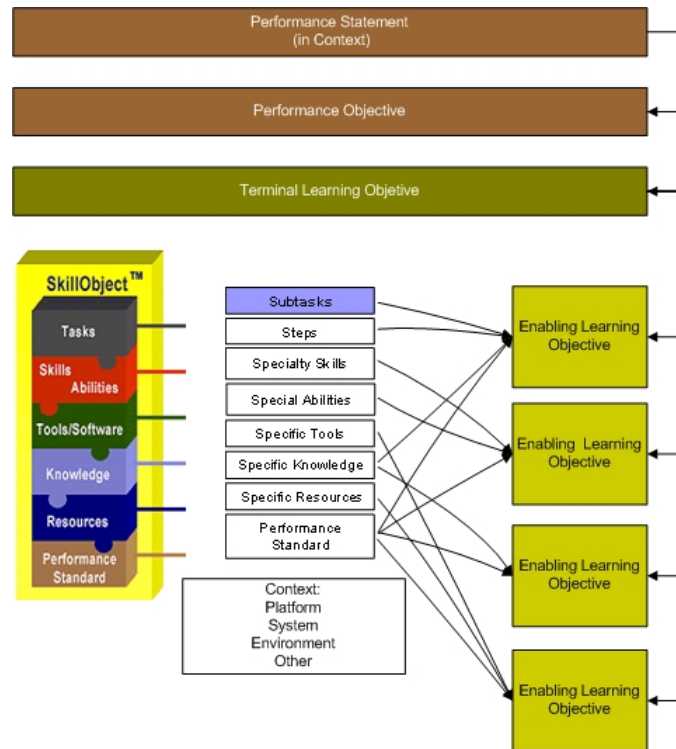
Figure 4   Traceability Matrix

As illustrated, the traceability matrix between SkillObjects[SM] and Learning Content includes SkillObject [TM] performance statements, contextual application, performance objectives, and learning objective statements, which are composed of both a terminal objective statement and one or more enabling objective statements.

6.   Research-based

To expedite the development of learning objectives and their specifications, the ILE Content Team has elected to begin with a widely used taxonomy developed by Bloom, Englehart, Furst, Hill, & Krathwohl (1956), with additional guidance from other noted researchers (Gronlund, 1985, 1995; Dick, Carey, & Carey, 2001; Heinich, Molenda, & Russell, 1993; Kibler, 1981; Krathwohl, Bloom, & Masia, 1964; Mager, 1984; Morrison, Ross, & Kemp 2004; Rothwell & Kazanas, 2004; and Smith & Ragan, 1999).

7.   Assumptions

Research work, such as that of the Advanced Distributed Learning (ADL) group and the SCORM suggest the following assumptions may be made about learning objectives. Learning objectives are independent of (but related to):

- Any specific schema for skills, competencies or content
- Any performance gaps or audience
- Any specific technology or tool
- Any instructional method or delivery medium/media

8.   Intent

Learning objectives stand alone. Learning objective statements are in context with the content. Learning objective statements are developed using decision trees. The first step in developing the learning objective statement is to determine its intention.

Intent is determined by the performance gap as well as the audience characteristics. Determining the intent of instruction is the first step in understanding what is to be learned, i.e., "What do I want the learner to do?" The answer to this question determines the verb domain and category. Based on Bloom's taxonomy, there are three broad "intent" domains: cognitive, affective, and psychomotor. Each domain has subcategories that are used to further refine intent.

In order to formulate a learning objective statement, the learning objective outcome is selected first. Once selected, the learning objective is further refined by selecting a verb from the respective subcategory that further defines the outcome of learning.
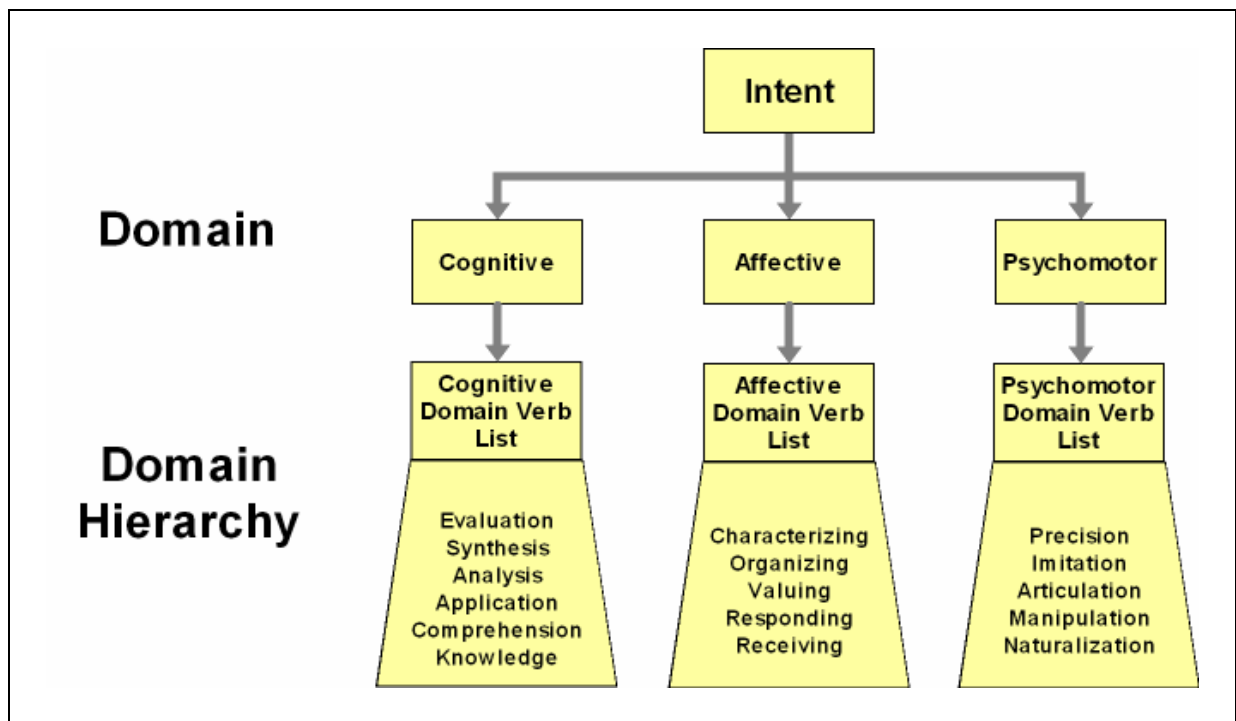
Figure 5   Intent, Domain, Domain Hierarchies, and Domain Verb Lists
               Bloom, et al (1956), Krathwohl, Bloom, & Masia (1964), and Heinich,
               Molenda, & Russell (1993)

9.   Components

Robert Mager (1962) was the first to define a learning objective statement as a three-component verbal statement. The three components are a description of the:

- Behavior or action that demonstrates or shows evidence of learning
- Conditions of the demonstration of that action
- Standard that will be applied to measure successful completion

9.1. Behavior

What behavior can the learner demonstrate or what evidence can be provided to indicate that the learner has mastered the job/position-required knowledge or skills specified in the instruction?

The very basic behavior (learning objective) includes a verb and an object. A verb repository will exist within the ILE architecture that sorts and selects verbs by the Intent domain and category. See Enclosure 2.

The information provided in the blue boxes in this document contains a description of future ILE LOS software.

Future ILE LOS software functionality parameters for verb selection include:

- Verbs are selected from a repository that is a subcategory of the cognitive, affective, and psychomotor domains. See Enclosure 1 and 2.
- Categories are hierarchical and based upon a synthesis of learning theory research.
- Guided by Intention, users may select the verb either by category or by domain.
- The learning objective statement will be developed based on a controlled vocabulary verb list that is aligned to verbs used in the SkillObject™ taxonomy.
- The category for a terminal objective must be equal to or higher than the enabling objectives of which it is related.

9.2. Condition

What resources are needed or under what conditions will the evaluation take place?

The condition describes the tools or information that the learner will be given in order to demonstrate completion. Conditions should include:

- The cue or stimulus that the learner will use to search information stored in the learner's memory, e.g., "Given the definition . . .", "Given a set of alternatives. . .", etc.
- The characteristics of any resource material required to perform the task, e.g., illustrations, software applications, physical objects, reference materials.
- The scope and complexity of the task and relevant or authentic contexts for the real-world performance setting, e.g., "Given an aerial map of the bombing target with resistance pockets identified. . ." ; "Given the strategic plans of three European allies . . ."; etc.

By setting the scope and complexity, the task is tailored to a specific target audience. Scope and complexity also aid in the transfer of knowledge/skill from the instructional setting to the performance setting. (Dick, Carey, & Carey, 2001). The contextual

analysis should describe the situation of job/position-related performance and thus help determine the condition.

Future ILE LOS software functionality for condition selection include:

- Conditions are selected from a data repository determined by the following categories: cue/stimulus (sensory data), resource materials (tools or physical/environmental restrictions), scope (resource boundaries), and complexity (levels of proficiency). See Enclosure 3.
- When the condition category label (i.e., cue or stimulus, resource material, scope, or complexity) is selected, a dropdown menu requires the user1 to further define the condition by identifying the parameter that is needed in the assembly of content. For example, cue (the category) is selected. Verbal, textual/visual, touch, taste, or smell (the parameter) is selected from the dropdown list. A second "open" input field requires that the user identify specifically what the parameter is (e.g., definition, graphic of an odometer, rough surface, cream sauce, smoke, etc.).
- Conditions are variable from one community of work to another. The parameter selection includes an "other" parameter. When "other" is selected, a second "open" field input will identify with specificity what the parameter is. For instance, within the electronics community IETMs are a common resource. The user composes the condition by selecting Cue: Textual, Electronic Manual; then Resource, Other, enter IETM, Module 4. However, by adding IETM to the Resource Material parameter list, the user could select Resource Material, IETM, and the Cue parameter would automatically fill.
- Other parameters and open fields will be periodically sorted (quarterly is recommended if not more frequently, especially in the initial development stages) to determine frequency use to add to the provided lists.
- Quarterly reports of these sorts will be sent by the Echelon III Commands to the ILE Content Team Lead to add information to the ILE system.
- Cues or stimulus are anything that you perceive in your environment through the five senses.
- Tools and resource materials are physical objects. Examples include: visual aids, printed materials, reference documents, software applications, job aids, tools, or equipment.
- Resource material must be identified before the scope is selected.
- Scope identifies the physical or environmental boundaries applied to the resource material. Examples include: delineation lines, inclusive pages/chapters/et al., data banks, formulas, checklists, EOS, hammers, meters, radio, etc.
- Complexity is determined by a contextual analysis or use case requirements, and takes into consideration the proficiency of the primary audience.
- Complexity is an optional identification field and generally this information does not appear within the assembled learning objective statement.
- There are occasions – particularly with declarative knowledge objectives – when no conditions are necessary (Smith & Ragan, 1999). For example: List the steps in cutting a bolt.

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[1] Generic term used to describe those individuals that have responsibility for input into and work within instructional systems.

9.3.   Standard

What is the measurement that will indicate successful or acceptable performance or proficiency?

The standard describes what behavior will be acceptable or the limits within which a behavior must fall. The standard identifies the minimum acceptable performance level.

With some cognitive skills, responses may vary within the established parameters. For variation, the standard should include the degree of tolerance for an acceptable response. Grading rubrics in the form of checklists or rating scales may assist with measuring variable responses. See Enclosure 6.

Mager (1962) as discussed in Smith and Ragan (1999) identifies some of the more common standards:

- Accuracy (student's answer must be within X degrees)
- Number of errors (with five mistakes or fewer)
- Number of correct responses (with minimum score of 80%)
- Time (not to exceed 30 minutes)
- Consistency within an established standard (in order listed on the chart)
- Consistency within a stated standard (includes one of the following identifiers: aviation, surface, undersea)
- Satisfaction (person walks away satisfied)

Future ILE LOS software functionality parameters for standard selection include:

- Standards must be aligned to SkillObject™ performance criteria and will be selected from a repository determined by categories. See Encl 4.
- The standard is use case driven.
- Standards are identified at the assembly level. Each community has authority to define the standards appropriate to its body of knowledge.
- When the standard parameter is selected a second "open field" requires input to clearly define the information in the textual statement. For instance, the parameter "Consistent with established standard" is selected. The open field requires that the user identify specifically the amount of time allotted (e.g., 30 seconds, 45 minutes, 1 hour, etc.).
- Standards are highly variable in nature. The parameter selection will include an "other" category. When "other" is selected, a second response identifies with specificity what "other" represents.
- Other parameters and open fields will be periodically sorted (quarterly is recommended if not more frequently, especially in the initial development stages) to determine frequency use to add to the provided lists.
- Quarterly reports of these sorts will be sent by the Echelon III Commands to the ILE Content Team Lead to add information to the ILE system.
- Checklists, rubrics, and other variable measurement tools will be identified by name in the definitive information field. For example, "Given….the learner will…by completing procedures identified on Equipment A Checklist." See Encl 6.
- Standard specificity is based on the contextual analysis, the content, and the primary audience. For instance, the standard 90% or higher may be required for journeyman, but 70% or higher may be acceptable for an apprentice.
- Standards are written at the assembly level and are independent components from the learning objective.
- When no performance standard is stated, the assumption is that the standard implies100% accuracy.

10. Terminal Objective

A terminal objective is a major objective for a topic or task and describes the overall learning outcome. For example:

- Topic: Isolate the fault
- Terminal objective: Isolate the fault in the high frequency radio system.
- Terminal objective statement: Given a damaged high frequency radio system, the technician will isolate the fault within 30 minutes.

Terminal Objectives:
- Express the composite knowledge, skills, and abilities required at the contextual SkillObject™ level.
- Are composed of one or more EOs.

- May contain multiple components. For example, Perform Search and Rescue = Perform Search and Perform Rescue.
- Represent a statement of terminal behavior (i.e. the skills and knowledge we expect learners to achieve as a result of instruction) and a precise statement of a learning goal.
- Identify measurable behavior (assessed quantitatively and/or qualitatively); the verb mirrors the Performance Objective verb and should be suitable for assessment
- Describe the "what" of a SkillObject ^{TM} learning event.
- Are referenced by metadata.

11. Enabling Objective

An enabling objective supports a terminal objective. It is a subcategory. It generally describes specific behaviors (single activities) that must be learned or performed. To continue the example:

- Terminal objective: Isolate the fault in the high frequency radio system.
- Enabling objective: Trace the electrical flow of transistors in a radio unit.

Enabling Objectives:
- Are context-based, and express the composite knowledge, skills, and abilities required within a given context (i.e., Platform, Environment, System, Other).
- Context determines condition.
- May represent SkillObject ^{SM} tasks, subtasks, specialty skills, special abilities, specific tools, specific knowledge's, and specific resources required within the identified context.
- Represent discrete SkillObject ^{SM} components, and, as such, are independent of other EOs – collectively they support a TO.
- Identify measurable behavior (assessed quantitatively and/or qualitatively); the verb mirrors the performance objective verb and should be suitable for assessment.
- Require metadata definition.
- May not require assessment if EO is inherent (example definition). For example, if your objective is, "Define the term electrical flow and state its purpose." The "definition" phrase will be contained within the purpose statement and may not need to be assessed separately.

12. Traceability Matrix

As part of the Instructional Media Design Package (IMDP) for content to be assembled, the designers will provide a traceability matrix that links the topics and objectives to tasks within SkillObjects™. See Figure 3.
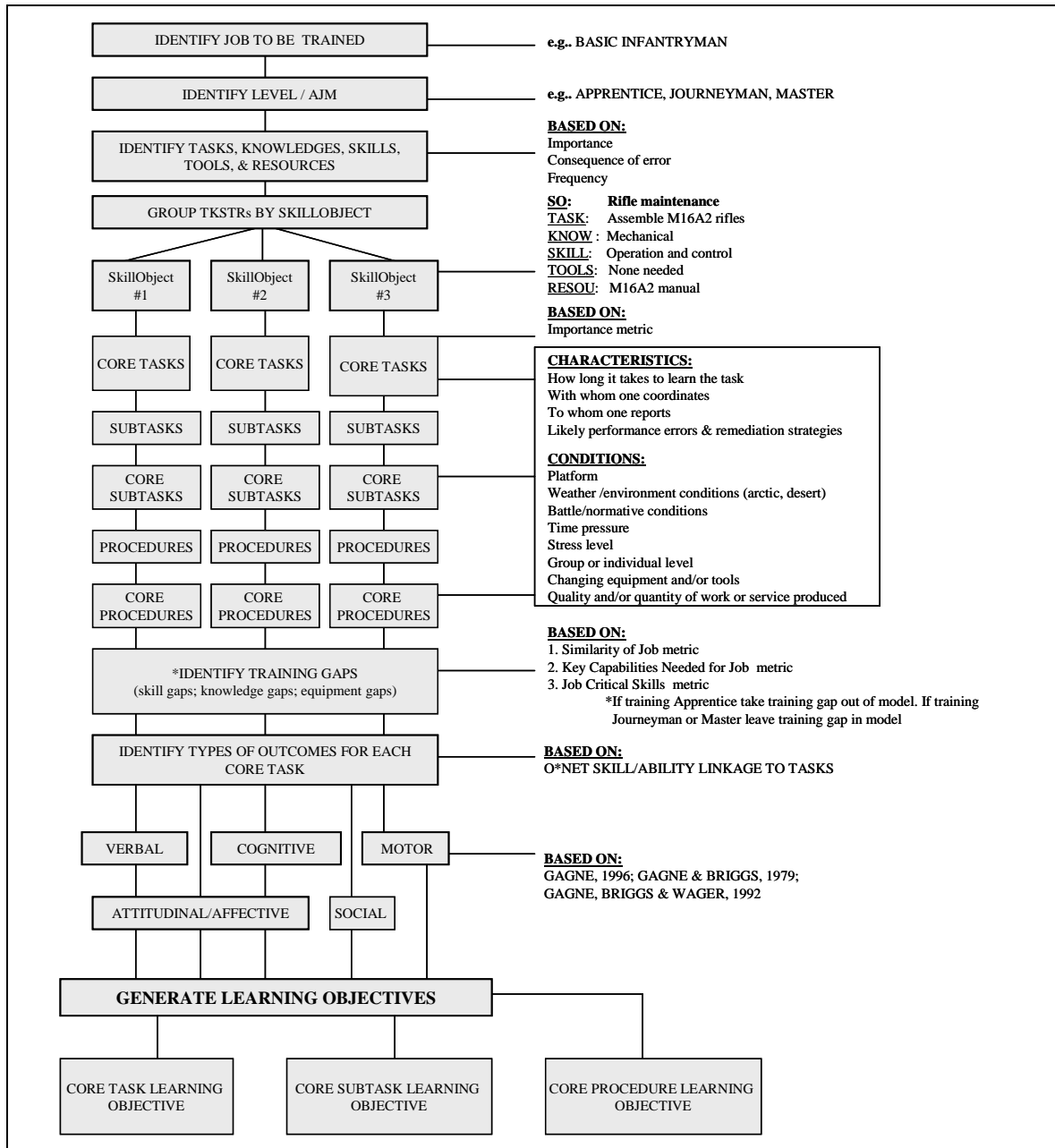
Figure 6   Learning Objectives Flowchart

The Science of Learning (SL) Directorate within the Human Performance Center guides practitioners in applying the SL (i.e., the foundational methodology for understanding what learning is, how people learn, and how learning translates to measurable performance) to learning-related decisions in the Navy. SL intersects the Learning Objectives Flowchart at three critical points:

1. Execution of Needs Assessments: Identified in chart as "Identify Tasks, Knowledges, Skills, Tools, and Resources"
2. Execution of Gap Analyses: Identified in chart as "Identify Training Gaps"
3. Generation of Learning Objectives: Identified in chart as "Generate Learning Outcomes"

For each of these stages, practitioners should undertake a deliberate effort to select and execute a methodology that is in alignment with current and validated theories, technologies, and best practices. Basing methodology selection and execution on SL will drive the Navy toward better predictive value for the acquisition, transfer, and retention of learning content by our workforce. Thus, there is risk of unsuccessful alignment between LOS and job requirements; SL reduces this risk. Further, error amplification makes it very costly to go backwards to solve alignment problems. It is far better to reduce these risks early in the process through a reflective approach.

Science of Learning interventions are reflected in content development as:

- New content development as the result of a new training requirement or equipment.
- Revision to existing content as the result of a change to a training requirement, equipment or periodic curriculum review.
- Periodic maintenance for currency, accuracy, and relevancy.
- Legacy conversion of existing content to a new delivery mode.

If the content development is new, then a top-down approach is taken in the Learning Objectives Flowchart. If the content development is revision, maintenance, or conversion, then a bottom up approach is used.

13.   Terminology

Checklist. A checklist is a list of specific behaviors, characteristics of a product, or activities, and includes a place for marking whether each is present or absent (Nitko, 2004).

Competency. Competencies include observable behaviors, outputs, or outcomes that demonstrate the knowledge, skills, and abilities (KSAs) needed to successfully perform a work role/occupational function.
- Core competency—Representative of Navy Mission.
- Cross-functional competency—Generalized sets of attributes that link to job requirements, enable mission interoperability, and transferability across communities and job families.
- Specialty competency—Skills, knowledge, and abilities that lead to successful performance of a specific job.
- Enterprise competency—Show link between DOD and Navy mission-essential competencies.

Learner. The ILE exists not only to serve the active duty Sailor, but the civilians and family members as well. Throughout this document, as well as other associated documents and in the learning literature, "learner" is the preferred generic term that refers to individuals who have access to lessons in the integrated instructional systems.

Measurable. The learning objective statement is one of the foundational pieces found within the instructional design literature. It answers the universal question, "What is it the learner should be able to do (or know) after completing the instruction?" Grounded in behaviorism, its inception mandated that the objective statement be both measurable

and observable. Advances in learning research now support the argument that objectives statements be measurable, which can then be objectively quantified with precision, rather than subjectively measured through observation.

Performance Assessment. Performance assessment presents a task requiring the learner to do an activity that requires applied knowledge and skills from several learning events and uses clearly defined criteria to evaluate how well the learner has achieved this application. Checklists or rubrics are used to ensure consistency in measurement from one learner to another (Nitko, 2004).

Rating Scale. A rating scale consists of numbers, such as 0 to 3, or 1 to 5, that reflect the quality levels of performance. Each numeral corresponds to a verbal description of the quality level it represents (Nitko, 2004).

Rubric. A rubric is a coherent set of rules used to evaluate the quality of a student's performance. They guide the judgments and ensure that the rules are applied consistently from one learner to another. The rules may be in the form of a rating scale or a checklist.

Traceable. Contemporary instructional design has recognized the connectedness between learning objective statements, content, assessments, and tasks that a learner will eventually perform. Since the Navy has embraced the O*NET taxonomy to describe work requirements in terms of tasks learned together, performed together, and evaluated together; construction of the LOS described in this document is defined in a structure which aligns learning interventions to identified job demands. The procedures described in this document tie the work of instructional design to component SkillObject™ knowledges, skills, and abilities.

User. The generic term that refers to those individuals or groups that have responsibility for input into and work within the instructional systems.

14. Command Review

It is the responsibility of the Echelon III Commands to provide specifications and guidance for periodic review of objectives placed within the ILE. See Encl 5. Additionally, prior to providing objectives to a developer for assembly in content, the Command responsible for the content should review objectives for currency, accuracy, and relevancy. The following guidelines are provided to use when examining objectives with content development.

First:
- Check the learning objective to determine if it is complete and adequately describes the intended outcome.
- Check the learning objective to determine if it is concise and avoids misinterpretation.
- Check the behavioral objective to determine if it includes a verb, object, condition, and may include a standard.
- Check the cognitive objective to determine if it has a general statement and a supporting specific statement(s).

Second:
- Determine whether the objective is aligned with the task analysis and performance goals.
- Determine if the objective is written at the appropriate level to match the skill or knowledge.

Third:
- Determine if the standards, if applicable, appear in the learning objective statement.
- Determine if the standards appear in the Assessment Item Specification Plan. See Ref C, noted on page 1 of this document.

15. Technical Requirements

All information placed in the Learning Objective repositories will meet the technical specifications as set forth by the Navy's ILE Content and Architecture Systems Leads.

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SYSCOM

Enclosure 1.   Domain and Verb List Decision Tree

INTENT   What is it the learner should be able to do or know?

COGNITIVE DOMAIN

Select By Category

Evaluation
Synthesis
Analysis
Application
Comprehension
Knowledge

or

**C
A
T
E
G
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I
E
S**

AFFECTIVE DOMAIN

Select By Domain

Characterizing by a value complex
Organizing
Valuing
Responding
Receiving

Verb List

Select By Category

PSYCHOMOTOR DOMAIN

Naturalization
Articulation
Precision
Manipulation
Imitation

Enclosure 2.   Domains, Categories and Verb Lists

Cognitive Domain

Evaluation
(Requires synthesis, analysis, application, comprehension, and knowledge)

Judging the value of an idea, procedure, method; make qualitative judgments using criteria from internal and external sources.

Appraise	Edit	Rate
Argue	Enlist	Recommend
Ascertain	Estimate	Recruit
Assess	Evaluate	Relate
Attach	Explain *	Resolve
Avert	Hire	Revise
Choose Or Select (Based	Interpret	Score
On Evaluation)	Judge	Select
Compare	Justify	Summarize (Based On
Conclude	Lead	Evaluation)
Consult	Make A Decision	Support
Contrast*	Measure	Validate
Criticize	Negotiate	Value
Critique	Offer	Write (A Review)
Decide	Predict	
Defend		
Describe *		
Discriminate *		

*by itself belongs to a subcategory

Synthesis
(Requires analysis, application, comprehension, and knowledge)

Putting together elements or parts of a whole that reflects originality; to form a new whole, e.g., production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information.

Analyze	Effect	Perform (in public)
Annotate	Establish	Plan*
Apply	Explain*	Predict
Arrange	Extend	Prepare
Assemble	Find	Prescribe
Assume	Formulate (an original idea)	Present (an original report)
Categorize	Generalize	Produce*
Change	Generate	Project
Collect	Guide	Propose
Combine	Hypothesize	Rearrange
Combine and organize	Illustrate	Reason
Compile	Infer	Reconstruct
Compose	Integrate	Relate
Conceive	Invent	Reorganize
Conclude	Investigate	Resolve
Construct	Lay-out	Revise
Convert	Locate	Rewrite
Create	Make	Search
Criticize	Manage	Solve
Decide	Maneuver	Set up
Defend	Manipulate	Summarize
Derive	Mediate	Supervise
Design	Mitigate	Synthesize
Determine *	Modify	Tell
Develop *	Monitor	Triage
Devise	Observe	Use
Diagram	Organize	War game
Direct	Originate	Write (an original
Discover	Oversee	composition)
Document		
Draft		

*by itself belongs to a subcategory

Analysis
(Requires application, comprehension, and knowledge)

Ability to break down values and organize them into clear ideas or patterns, detecting, and establishing relationships among them.

Analyze	Differentiate between (by	Organize
Appraise	analysis)	Outline*
Breakdown	Discriminate	Point out
Calculate *	Distinguish *	Probe
Categorize	Draw conclusions	Process
Challenge	Examine	Question
Classify	Experiment	Relate
Compare	Form generalizations	Select (judgment involved)
Contrast	Formulate	Separate *
Criticize	Generalize	Show relationships
Debate	Identify *	Solve
Deduce	Illustrate *	Subdivide *
Detect	Infer *	Survey
Determine	Inspect	Test
Diagnose	Interview	Troubleshoot
Diagram	Make inferences	Verify
Diagram Audit		

*by itself belongs to a subcategory

Application
(Requires comprehension and knowledge)

Ability to use ideas, principles, procedures, and theories in specific and general situations.

Accumulate	Employ	Prepare
Activate	End	Present
Advice	Estimate	Prioritize
Affect	Execute	Process
Allocate	Expand	Produce
Apply	Express	Program
Assert	Express in a discussion	Proof
Assume	Facilitate	Prove
Build	Find (implies investigation)	Prove (in math)
Calculate	Finish	Provide
Call	Gauge	Reclaim
Change	Graph	Refer to
Check	Host	Relate
Clear	Illustrate	Resume
Collect information (supply correct equation formula)	Implement	Retrieve
	Indicate	Scan
Compute	Initiate	Schedule
Condense	Interpret	Sending
Conduct	Investigate	Set up
Construct	Keep records	Ship
Convert	Locate*	Show
Counsel	Log	Sign on (as in computers)
Delete	Log-in (as in computers)	Situate
Deliver	Log-out	Sketch
Demonstrate	Make	Solve (problems expressed in words)
Derive	Manipulate	
Determine	Map	Sort
Develop	Modify	Start
Differentiate	Operate	Stop
Differentiate between	Organize	Store
Discover	Participate	Submit
Discuss	Pause	Supply
Dispense	Perform	Terminate
Distinguish	Persuade	Trace
Distinguish between	Phone	Transfer
Download	Plan	Translate
Dramatize	Practice	Upload
Draw	Predict (from known factors)	Use
Edit		Write

*by itself belongs to a subcategory

Comprehension
(Requires knowledge)

The ability to grasp the meaning, intent, or relationship of facts, principles, or procedures. Translating material from one form to another (words or numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects).

Appraise	Explain (express in other terms)	Put in order
Change		Recognize
Classify	Express	Record
Code	Extend Figure	Report
Compile	Find (locate)	Restate
Compose	Find (as in math)	Review
Compute	Find the difference	Rewrite
Confer	Format	Route
Correct	Forward	Select
Decipher	Generalize	Simplify
Decode	Give example	Solve
Defend	Identify	Subtract
Define (in students words)	Illustrate	Suggest
Depict	Indicate	Summarize
Describe	Infer	Trace
Discriminate	Locate	Trace (on map, chart)
Discuss	Measure	Transcribe
Distinguish	Obtain	Translate
Encrypt	Outline	
Estimate	Paraphrase	
Evaluate	Predict	

Knowledge

The ability to recall, to bring the appropriate material to mind.

Advise
Allocate
Announce
Answer
Arrange
Assign
Authorize
Brief
Calculate
Categorize
Certify
Choose from a list
(judgment not included)
Cite
Classify
Coach
Collate
Compare
Complete
Confirm
Consolidate
Contrast
Correlate
Cross-check
Define (give a dictionary
definition)
Describe
Designate
Differentiate
Discriminate
Distinguish
Distribute
Divide

Duplicate
Elaborate
Eliminate
Enumerate
Exchange
Express
Extract
Fill in the blank (or
complete)
Finalize
Follow directions
Gather
Group
Identify
Indicate
Inform
Instruct
Label
Learn
Level
List
Locate (on a map or given
document)
Match
Memorize
Name
Notify
Order
Organize
Outline
Quote
Rank
Read

Realign
Rebuild
Recall
Recite
Recognize
Recollect
Recommend
Record
Recount
Recreate
Redistribute
Reexamine
Relate
Reorganize
Repeat
Reproduce
Respond
Restate
Schedule
Select (judgment not
involved)
Separate
Sort
Specify
State
Task
Teach
Tell
Template
Train
Translate
Tune
Underline
Update

Affective Domain

Characterizing by a Value or Value Complex
(Requires receiving, responding, valuing, and organizing)

Ability to internalize values developing a "life style". The behavior is pervasive, consistent, and predictable.

Act	Devote	Prescribe
Advocate	Disclose	Preserve
Alert	Discriminate	Prioritize
Allow	Display	Promote
Alter	Encourage	Propose
Appreciate	Endure	Qualify
Approve	Enforce	Question
Assess	Ensure	Rally
Assume	Exemplify	Rationalize
Authenticate	Exonerate	Reassess
Behave	Favor	Reserve
Balance	Formulate	Respect
Belief	Function	Retain
Cancel	Imagine	Review
Choose	Incorporate	Revise
Command	Influence	Sell
Complex	Innovate	Serve
Conceive	Judge	Share
Conform	Justify	Support
Conjecture	Listen	Study
Conserve	Maintain	Uphold
Constitute	Modify	Use
Continue	Pattern	Validate
Coordinate	Perform	Verify
Defend	Practice	Vindicate
Develop		
Devise		

Organizing
(Requires receiving, responding, and valuing)

Ability to bring together different values, resolve conflicts between them to build an internally consistent value system.

Adapt	Defend	Order
Adhere	Establish	Organize
Align	Explain	Perceive
Alter	Formulate	Prepare
Arrange	Generalize	Rank
Attend closely	Group	Rate
Categorize	Identify	Recognize
Characterize	Integrate	Reconnoiter
Classify	Listen	Relate
Combine	Listen attentively	Show awareness
Compare	Modify	Show sensitivity
Complete	Monitor	Synthesize
Complex	Observe	Systemize
Coordinate		

Valuing
(Requires receiving and responding)

Ability to see worth or value in the subject, activity, and assignment. Student is motivated, not by the desire to comply or obey, but by the commitment to the underlying value guiding the behavior. Behavior is consistent and stable making value clearly identifiable.

Accept	Endorse	Prefer
Adopt	Enjoy	Propose
Approve	Ensure	Read
Choose	Exhibit	Report
Commit	Explain	Sanction
Complete	Express	Select
Describe	Form	Share
Desire	Initiate	Study
Differentiate	Invite	Work
Display	Join	
Dispute	Judge	
	Justify	

Responding
(Requires receiving)

Ability to participate. Seeks out and gains satisfaction from working or engaging in activity.

Accomplish	Contribute	Participate
Achieve	Cooperate	Question
Acknowledge	Demonstrate	Permit
Advise	Describe	Praise
Agree	Discipline	Pursue
Aid	Discuss	React
Allow	Dispatch	Read
Announce	Encode	Refuse
Answer	Execute	Reply
Anticipate	Follow-up	Report
Apologize	Give	Request
Ask	Greet	Respond
Assist	Help	Resume
Communicate	Indicate	Seek
Complete	Inquire	Select
Complete assignment	Interpret	Show
Comply	Label	Visit
Conform	Notify	Volunteer
Consent	Obey	Welcome
Contact	Obey rules	Write

Receiving
(Ability to receive or to attend to particular phenomena or stimuli.)

Divided into three subcategories: awareness, willingness to receive, and controlled or selected attention.

Acknowledge	Getting attention	Receive
Ask	Give	Reply
Attend	Hold	Select
Be aware	Holding attention	Show alertness
Choose	Identify	Tolerate
Describe	Listen	Use
Directing attention	Listen locate	View
Follow	Name	Watch

Psychomotor Domain

Naturalization
(Requires imitation, manipulation, precision and articulation)

Response is automatic. Ability to experiment, creating new motor acts or ways of manipulating materials out of understandings, abilities, and skills developed. One acts "without thinking."

Acquire	Distribute	Open
Arrange	Divide	Operate
Assemble	Do	Originate
Blend	Drive	Pace
Break up	Enact	Perform
Carry	Encircle	Produce
Carry out	Enclose	Progress
Cause	Establish	Raise
Clean	Execute	Refine
Combine	Fit	Reject
Complement	Handle	Relate separate
Complete	Hold	Rewire
Compose	Improve	Stoop
Conduct	Incorporate	Transcend*
Connect	Initiate	Transfer
Constitute	Insert	Transport
Construct*	Invent	Unite
Contrive	Involve	
Control	Join	
Correct	Lift	
Create	Link	
Design	Load	
Disconnect	Maintain	
Dismantle	Make	
Disperse	Manipulate	
	Merge	

*by itself belongs to a subcategory

Articulation
(Requires imitation, manipulation, and precision)

Higher level of precision: Ability to modify movement patterns to fit special requirements or to meet a problem situation.

Acclimatize	Lead	Relieve
Accommodate	Map	Reorder
Adapt	Modify	Reorganize
Adjust	Modulate	Reorient
Alter	Mutate	Reshuffle
Ambush	Navigate	Retool
Attack	Neutralize	Revert
Bend	Occupy	Revise
Break	Orient	Spin
Bypass	Oscillate	Square
Change	Pack	Suppress
Conduct	Patrol	Surpass *
Deploy	Prevent	Swing
Direct	Program	Swirl
Draw	Protect	Tailor
Evade	Queue	Temper
Fit	Readjust	Train
Fix	Rearrange	Transcend *
Flip	Reconcile	Transpose
Grasp	Reconstitute	Turn
Infiltrate	Reconstruct	Twirl
Inverse	Recover	Twist
Invert	Reduce	
Lay	Regulate *	

*by itself belongs to a subcategory

Precision
(Requires imitation and manipulation)

Skill has been attained. Proficiency is indicated by a quick, smooth, accurate performance, requiring a minimum of energy. The overt response is complex and performed without hesitation.

Access	Dispatch	Log	Record	Tap
Accomplish	Displace	Lubricate	Reestablish	Test
Achieve	Display	Make safe	Refine	Tighten
Activate	Dispose	Maneuver	Refuel	Trace
Actuate	Disseminate	Maintain	Regulate	Transcend
Adjust	Drive	Manage	Release	Transfer
Administer	Egress	Master	Relocate	Transmit
Advance	Elevate	Mount	Remove	Transport
Align	Emplace	Move	Repair	Treat
Archive	Employ	Navigate	Replace	Troubleshoot
Arm	Energize	Obtain	Replenish	Type
Assemble	Engage	Open	Reset	Unload
Attach	Enter	Operate	Retrieve	Update
Attain	Enter	Order	Return	Utilize
Automatize	Establish	Outdo	Rise	Write
Balance	Evacuate	Outmatch	Rotate	Zero
Beat	Exceed	Outperform	Save	
Become proficient	Excel	Outrank	Scale	
Breach	Exchange	Outweigh	Score	
Calibrate	File	Overcome	Secure	
Camouflage	Fill out	Overhaul	Self-regulate	
Center	Fire	Park	Send	
Charge	Fit	Pass	Service	
Clean	Fuel	Perform	Set up	
Clear	Ground	Place	Shut down	
Climb	Harden	Plot	Sight	
Close	Hoist	Police	Signal	
Collect	Initialize	Position	Splint	
Connect	Input	Post	Squeeze	
Cover	Insert	Press	Stockpile	
Debrief	Inspect	Pressurize	Store	
Debug	Install	Process	Stow	
Decontaminate	Install	Procure	Strike	
Deliver	Integrate	Provide	Submit	
Destroy	Intercept	Publish	Succeed	
Diagnose	Isolate	Qualify	Supervise	
Dig	Issue	Raise	Support	
Disassemble	Jack	Range	Surpass	
Disconnect	Key	Rank	Sweep	
Disengage	Launch	Reach	Take	
Dismantle	Load	Receive	Take charge	

Manipulation
(Requires imitation)

Ability to continue practicing a skill or sequence until it becomes habitual. The response is more complex than at the previous level, but learners still are not "sure of themselves."

Acquire	Fit (parts together)	Pace
Advance	Follow	Perform
Assemble (higher level skills)	Guide	Produce
	Handle	Progress
Break up *	Hover	Raise
Carry	Improve	Regulate
Clean	Insert	Rewire
Complete	Land	Steer
Conduct	Lift	Stoop
Control	Load	Take off
Disconnect	Maintain	Track
Dismantle	Make	Transfer
Disperse	Maneuver	Transport
Distribute	Manipulate	Traverse
Do	Open	Use
Drive	Operate	
Execute		

Imitation
(Ability to learn complex skills overtly.)

Repeating an act that has been demonstrated or explained, via trial and error until an appropriate response is achieved.

Assault	Disorganize	Outline	Shorten
Assemble	Dissect	Perforate	Simulate
Attempt	Disturb	Perform	Sketch
Begin	Divide	Pierce	Slice
Blueprint	Draft	Pull	Split
Break up	Draw	Practice	Smell
Calibrate	Duplicate	Proceed	Start
Carry	Enlarge	Reinforce	Stay
Carry out	Fall	Remove	Strengthen
Carve	Feel	Repair	Stretch
Construct	Follow	Repeat	Swim
Copy	Fortify	Replace	Taste
Creep	Hear	Replicate	Throw
Cut	Hold	Represent	Try
Delineate	Imitate	Reproduce	Turn
Depart	Increase	Respond	Twist
Depict	Jump	Run	Visualize
Detect	Lift	Scan	Wear
Diagram	Mimic	Scatter	

Disassemble	Mock	See
Discompose	Move	Separate
Disjoint	Organize	Shift

Note: * Indicates that the verb by itself is from a subcategory; the verb needs to be combined with a verb from the current category to be part of that category. Following is an example using the verb "identify" in the Cognitive Domain.

Knowledge (by itself, belongs to the Knowledge category)
Given six food elements differing in nutritional value, the culinary specialist will be able to identify the nutritional value for each food element. This task will be done with at least 80% accuracy.

Analysis: (Combined with a verb in the Analysis category, the verb from Analysis takes precedent.)

Given 10 meal groups made of a combination of six food elements, differing in nutritional value, the culinary specialist will be able to identify the nutritional value for each food element and classify them into sets that contain different food groups. These sets will be arranged in ascending order from most nutritional to less nutritional in value. This task will be done with at least 80% accuracy.

When a verb is found on two categories—with equal weight

Sometimes the same verb is found in two categories, e.g., classify is listed in both Comprehension and Analysis. The difference considers the content and the task. Comprehension requires the learner to understand the relationship between elements or groups and maybe add some element(s) to existing groups; classifying an element among existing options.

Analysis requires the learner to come up with the classification based on specific characteristics supported by the analysis of such elements. The differences between one category (Comprehension) and the other (Analysis) is explained in the conditions and behavior expected from the audience.

Enclosure 3.   Condition Decision Tree

CONDITION   What will the learner be given or use during the performance measurement?

CUE OR STIMULUS (sensory data**)**

Verbal
└───────► definitive information__

Textual/Visual
└───────► definitive information__

Touch
└───────► definitive information__

Taste
└───────► definitive information__

Smell
└───────► definitive information__

```
Category =  CUE

   Parameter = Verbal

      Open field = definitive information
```

RESOURCE MATERIAL (physical or electronically-based objects)

EPSS
└───────► _definitive information__

Equipment
└───────► _definitive information__

IETM
└───────► _definitive information__

Job aid
└───────► _definitive information__

MLT
└───────► _definitve information__

Printed materials
        _definitive information__

Reference documents
        _definitive information__

Simulation
        _definitive information

Software applications
        _definitive information__

Tools

Other   _definitive information

SCOPE (resource boundaries)

────────────► __definitive information

────────────► __definitive information

────────────► __definitive information
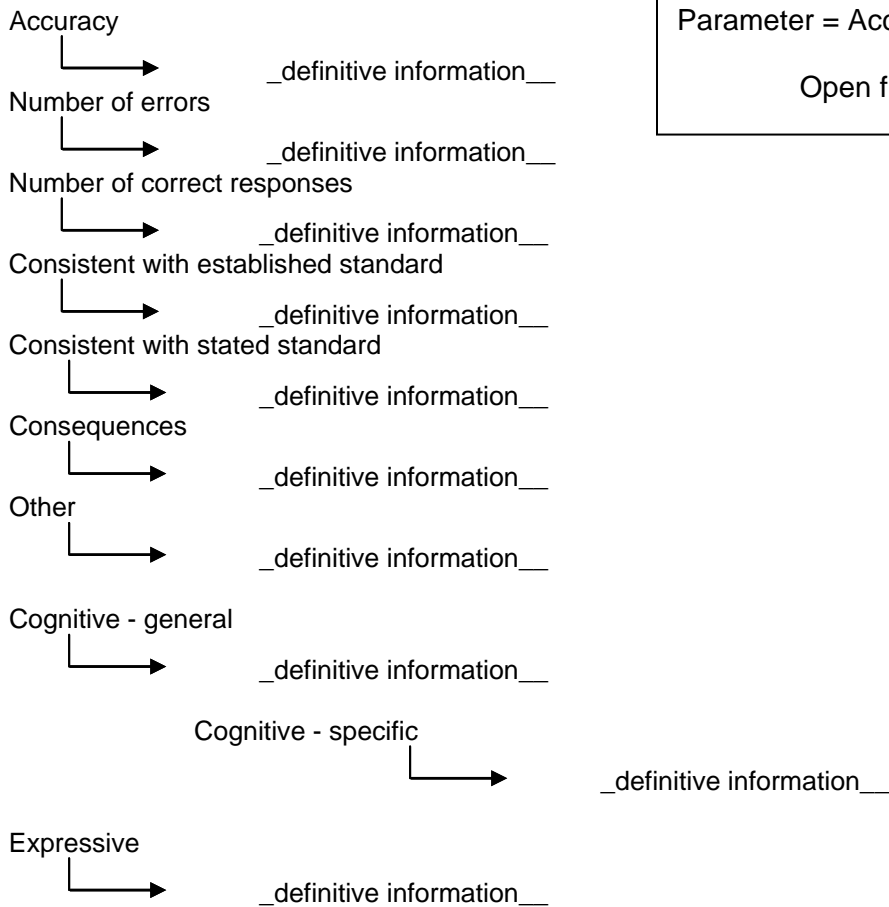
────────────► __definitive information

────────────► __definitive information

COMPLEXITY (level of proficiency primary audience)

Apprentice
└───────► _definitive information__

Journeyman
└───────► _definitive information__

Master
└───────► _definitive information__

Other
└───────► definitive information

Enclosure 4.   Standard Decision Tree

STANDARD   What is the measurement that will indicate successful or
            acceptable performance?

Accuracy

⌐➔   _definitive information__

Number of errors

⌐➔   _definitive information__

Number of correct responses

⌐➔   _definitive information__

Consistent with established standard

⌐➔   _definitive information__

Consistent with stated standard

⌐➔   _definitive information__

Consequences

⌐➔   _definitive information__

Other

⌐➔   _definitive information__

Cognitive - general

⌐➔   _definitive information__

Cognitive - specific

⌐➔   _definitive information__

Expressive

⌐➔   _definitive information__

+---+
| Parameter = Accuracy |
| |
| Open field = definitive information |
+---+

Enclosure 5.   Process Review Guide

1.   <u>WORK PROCESS</u>: Learning Objectives

2.   <u>FUNCTIONAL CATEGORY</u>: Personnel and/or Organizational Management – Curriculum Development, Maintenance Review, and Control

3.   <u>BRIEF DESCRIPTION OF WORK PROCESS</u>: To ensure that procedures for designing, developing, implementing, and reviewing learning objectives within the confines of the ILE facilitate a quality learning experience for our Sailors.

4.   <u>REFERENCES</u>: Please cite the appropriate reference(s) associated with the Process Requirements in paragraph 6 below. There are a number of references that govern learning products.

(a) Navy Guide to Content Design, Development, and Deployment, Part 2, Content Design
(b) Integrated Learning Environment Guidance, ILEGUI1553-ISD-1, Instructional Systems Design and Instructional Design Processes
(c) Integrated Learning Environment Guidance, ILEGUI1553-ISD-2, Interim Assessment Guidance

Because technology advances at a rate faster than instructions can generally be issued, commands are advised to check the following sites frequently:

- Human Performance Center Spider: https://www.spider.hpc.navy.mil/
- Department of Defense Web Policies and Guidelines: http://www.defenselink.mil/webmasters/
- SECNAVINST 5720.47A Department of the Navy Policy for Content of Publicly Accessible World Wide Web Sites

5.   <u>WORK PROCESS SME(s)</u>: ILE POC is Jerry Best, HPC, N75, DSN: 380-4997, (COMM) (407) 380-4997. email: Jerome.best@navy.mil.

6.   PROCESS REQUIREMENTS: SME

COMMENTS
List main points in the form of a question that will assist the
Reviewer or SME when reviewing the process.

    a. At the Echelon III level

        (1) Has the EIII provided written specifications and guidance to each subordinate command on how learning objectives will be designed, developed, maintained, and reviewed in accordance with the ILEGUI1553-ISD-3 document?

        (2) Does the EIII have in place a transition plan or guidance to support the review of legacy learning objectives and to refine legacy content to meet the ILE requirements?

        (3) Does the EIII command have a periodic review schedule to assist commands with the new methodology?

    b. At the Subordinate Commands level

        (1) Did the subordinate command develop or adopt a procedure to design learning objectives incorporating the science of learning and human performance concepts?

        (2) Did the subordinate command prepare and maintain a traceability matrix for newly developed courses?

        (3) Does the subordinate command have a plan in place to periodically review learning objectives items to check alignment with assessment, content, and SkillObjects™?

        (4) Does the subordinate command have prepared checklists and grading rubrics for learning objectives for use by test administrators for performance tests?

7.   QUALITY ASSURANCE KEY METRICS: Identify the key metrics for measuring performance. These metrics should clearly indicate how "success" of the assessment will be defined and measured, and provide a quick view of how well the assessment development and implementation process is progressing in achieving its intended purpose.

Data collection for metrics should include at a minimum the following:

- Completion of the documentation identified in ILEGUI1553-ISD-1, 2, and 3
- Learner identification procedures
- Traceability Matrix (Crosswalk for linkage with SkillObjects™)
- Percentage of legacy learning objectives refined for warehousing within the ILE repository
- Timelines for refresh of the learning objectives

Enclosure 6.   Checklists and Rating Scales

Example of a checklist for assessing performance in setting up and using a microscope.

Learner's Actions	Sequence of Actions	Learner's Actions	Sequence of Actions
Takes slide	1	Skills in which learner needs further training	
Wipes slide with lens paper	2	In cleaning objective	✓
Wipes slide with cloth		In cleaning eyepiece	
Wipes slide with finger		In focusing low power	✓
Places drop or two of culture on slide	3	Noticeable characteristics of learner's behavior	
Adds few drops of water	4	Awkward in movements	✓
Wipes cover glass with lens paper	5	Slow and deliberate	
Wipes off surplus fluid		Unable to work without specific directions	✓
Places slide on stage	6	Very rapid	
Looks through eyepiece with right eye		Characterization of the learner's mount	
Looks through eyepiece with left eye	7	Poor light	✓
Turns to objective of lowest power	9	Poor focus	
Turns to high power objective	21	Excellent mount	
Holds one eye closed	8	Unable to find object	✓

Adapted from "A test of skill in using a microscope" by R. W. Tyler, 1930, Educational Research Bulletin, 9, p. 44, in Nitko's *Educational Assessment of Students,* p. 270.

When crafting a procedure checklist, first observe and study experts performing so you can identify all the appropriate steps. Then:
1. List and describe clearly each specific sub-performance or step in the procedure you want the learner to follow.
2. Add to the list specific errors that learners commonly make.
3. Order the correct steps and the errors in the approximate sequence in which they should occur.
4. Make sure you include a way either to check the steps as the learner performs them or to number the sequence in which the learner performs them.

Example of a rating scale for briefing a solution to a tactical problem

Score level = 3	Score level = 2
<u>Tactical knowledge</u> Shows understanding of the situation Uses appropriate methods to assess the situation <u>Strategic knowledge</u> Uses relevant outside information of a formal or informal nature Identifies all the important elements that impact the situation Selects an appropriate strategy to conduct the maneuver <u>Communication</u> Gives a complete response with a clear, unambiguous explanation Includes an appropriate and complete diagram Presents strong supporting arguments to decisions	<u>Tactical knowledge</u> Shows nearly complete understanding of the situation Uses some of the appropriate methods to assess the situation <u>Strategic knowledge</u> Uses some outside information Identifies most of the important elements that impact the situation Selects a successful alternative strategy to conduct the maneuver <u>Communication</u> Gives a fairly complete response with reasonably clear explanations Includes an appropriate and nearly complete diagram Presents supporting arguments with some minor gaps
Score level = 1	Score level = 0
<u>Tactical knowledge</u> Shows limited understanding of the situation Uses or fails to use appropriate methods of assessment <u>Strategic knowledge</u> Attempts to use outside information Fails to identify important elements that impact the situation Selects an inappropriate strategy for the maneuver <u>Communication</u> Has some satisfactory elements, but lacks significant parts in explanation Includes a diagram that is unclear or difficult to interpret Appears unprepared, "winging it"	<u>Tactical knowledge</u> Shows no understanding of the situation <u>Strategic knowledge</u> Uses irrelevant outside information Fails to indicate which elements are appropriate to the situation The strategy does not address the maneuver <u>Communication</u> Communicates ineffectively Diagrams misrepresent the maneuver

Adapted from "The Conceptual Framework for the Development of a Mathematics Performance Assessment Instrument, by S. Lane, 1992, Educational Measurement Issues and Practice, 12 (2), p. 23 in Nitko's *Educational Assessment of Students,* p. 267.

References

Bloom, B., Englehard, M., Furst, E., Hill, W., & Krathwohl, D. (1956). A taxonomy of educational objectives: Handbook I. The cognitive domain. New York: McKay.

Dick, W., Carey, L., & Carey, J. (2001). The systematic design of instruction. (5th ed.), New York: Addison-Wesley.

Eisner, E. (1969). Instructional and expressive objectives: Their formulation and use in curriculum. In W. J. Popham (Ed.), Instructional objectives: An analysis of emerging issues (pp. 13-18). Chicago: Rand McNally.

Gronlund, N. (1995). How to write and use instructional objectives (5th ed), New York: Prentice Hall.

Heinich, R., Molenda, M., & Russell, J. (1993). Instructional media and the new technologies of instruction (4th ed.), New York: Macmillan.

Kibler, R. (1981). Objectives for instruction and evaluation. Boston: Allyn & Bacon.

Krathwohl, D., Bloom, B., & Masia, B. (1964). A taxonomy of educational objectives: Handbook II. The affective domain. New York: McKay.

Mager, R. (1984). Preparing instructional objectives (2nd ed.), Belmont, CA: Pittman.

Mager, R., & Beach, K. (1967). Developing vocational instruction. Belmont, CA: Pittman.

Morrison, G., Ross, S., and Kemp, J. (2004). Designing effective instruction. (4th ed.), New York: John Wiley & Sons.

Nitko, A. (2004). Educational assessment of students, (4th ed), Upper Saddle River, NJ: Pearson.

Rothwell, W. and Kazanas, H. (2004). Improving On-the-Job Training: How to Establish and Operate a Comprehensive OJT Program, (2nd ed), New York: Jossey Bass.

Smith, P. and Ragan, T. (1999). Instructional Design. (2nd ed.), New York: John Wiley & Sons.